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(54) **CEMENT TREATMENT AGENT AND TREATMENT METHOD**

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a treatment agent and method to suppress simply and at a low cost the elution of hexavalent chromium from soil stabilized with cement and cement structures.
SOLUTION: The agent contains ferrous sulfate and quartzite-based rock powder mainly comprising silica and alumina. The ferrous sulfate is prepared by drying and pulverizing iron sulfide which is a by-product from the manufacturing process of titanium oxide. The rock powder is prepared by pulverizing quartzite-based metamorphic rocks.

CLAIMS

[Claim(s)]
[Claim 1]A processing agent of cement containing the 1st raw material that consists of ferrous sulfate, and the 2nd raw material that consists of the rock powder end of a **** system which uses silica and alumina as the main ingredients.
[Claim 2]A processing agent of the cement according to claim 1 by which ferrous sulfate of the 1st raw material is expressed with chemical symbol:FeSO4 and 7H 2O.
[Claim 3]A processing agent of the cement according to claim 2 processed powdered by grinding after ferrous sulfate of the 1st raw material drying an iron sulfide generated as by-products by a manufacturing process of titanium oxide.
[Claim 4]A processing agent of the cement according to claim 1 which grinds a metamorphic rock of a **** system the rock powder end of the 2nd raw material, and contains alumina for silica about 10weight % about 80weight %.
[Claim 5]A processing agent of the cement according to any one of claims 1 to 4 whose mixing percentage in the rock powder end of 20 to 80 weight % and the 2nd raw material mixing percentage of ferrous sulfate of the 1st raw material is 80 to 20 weight %.
[Claim 6]A disposal method of cement which has the 1st process of mixing the 1st raw material that consists of ferrous sulfate, and the 2nd raw material that consists of the rock powder end of a **** system which uses silica and alumina as the main ingredients, and manufacturing a processing agent of cement, and the 2nd process of mixing with cement a processing agent manufactured by the 1st process.

[Claim 7]A disposal method of the cement according to claim 6 which makes mixing percentage of a processing agent 5.0 to 0.5 weight % for mixing percentage of cement 95.0 to 99.5weight % in the 2nd process.
[Claim 8]A disposal method of cement characterized by comprising the following.
The 1st raw material that consists of ferrous sulfate.
The 1st process of mixing the 2nd raw material that consists of the rock powder end of a **** system which uses silica and alumina as the main ingredients, and manufacturing a processing agent of cement.
The 2nd process of scouring cement using solution which made dissolving a processing agent manufactured by the 1st process in cement kneading water, and was obtained by this.

[Claim 9]A disposal method of the cement according to claim 8 which makes mixing percentage of a processing agent 5.0 to 0.05 weight % 95.0 to 99.95weight % for mixing percentage of cement kneading water in the 2nd process.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention is a processing agent mixed and used for cement, for example, relates to the processing agent for controlling that hexavalent chromium elutes from the ground improvement which performed soil improvement with cement, or a cement structure, and a disposal method.

[0002]
[Description of the Prior Art]In recent years, since there is a possibility that hexavalent chromium of the concentration exceeding a standard may elute from the ground improvement which the soil pollution by hexavalent chromium serves as a big social problem, and performed soil improvement with cement under such a situation, the measure has been pressing SUBJECT.
[0003]
[Problem to be solved by the invention]By the way, although the method of precipitating and separating hexavalent chromium is taken using alkali chemicals, a flocculating agent, etc. as processing of the wastewater containing hexavalent chromium, In this method, much medicine additives and down stream processing are required, and elution of hexavalent chromium from the ground improvement by cement or a cement structure cannot be suppressed depending on this method.

[0004]The purpose of this invention is for ** to also provide inexpensive the processing agent of cement which can suppress elution of hexavalent chromium from cement **** ground improvement or a cement structure, and a disposal method by a simple method.
[0005]
[Means for Solving the Problem]Then, by supplying a processing agent which consists of various ingredients to cement or cement kneading water in order to attain the above-mentioned purpose, and repeating an experiment which measures an elution volume of hexavalent chromium, this invention person discovered that a processing agent which has a certain ingredient was very effective, and resulted in completion of this invention.
[0006]That is, a processing agent of cement concerning this invention includes the 1st raw material that consists of ferrous sulfate, and the 2nd raw material that consists of the rock powder end of a **** system which uses silica and alumina as the main ingredients. Elution of hexavalent chromium is effectively suppressed by mixing this processing agent in cement or cement kneading water so that the below-mentioned experimental result may prove.
[0007]Here, ferrous sulfate of the 1st raw material is specifically expressed with chemical symbol:FeSO4 and 7H 2O. Ferrous sulfate of the 1st raw material is processed powdered by grinding, after drying an iron sulfide generated as by-products by a manufacturing process of titanium oxide. Therefore, the 1st raw material can be manufactured inexpensive and easily.
[0008]On the other hand, a metamorphic rock of a **** system is ground and, specifically, alumina is included for silica about 10weight % about 80weight % the rock powder end of the 2nd raw material. Therefore, it can manufacture inexpensive and easily also about the 2nd raw material.
[0009]As mixing percentage of the 1st raw material and the 2nd raw material, it is preferred that mixing percentage of ferrous sulfate is [mixing percentage in 20 to 80 weight % and the end of rock powder] 80 to 20 weight %. A higher effect is acquired by setting mixing percentage as this range.
[0010]The 1st raw material in which the 1st disposal method of cement concerning this invention consists of ferrous sulfate, The 2nd raw material that consists of the rock powder end of a **** system which uses silica and alumina as the main ingredients is mixed, and it has the 1st process of manufacturing a processing agent of cement, and the 2nd process of mixing with cement a processing agent manufactured by the 1st process. It is the 2nd process and, specifically, mixing percentage of a processing agent is made into 5.0 to 0.5 weight % for mixing percentage of cement 95.0 to 99.5weight %. In this disposal method, since a processing agent as powder is mixed and used for cement, enforcement at a cement production factory is attained.
[0011]The 2nd disposal method of cement concerning this invention, The 1st raw material that consists of ferrous sulfate, and the 2nd raw material that consists of the rock powder end of a **** system which uses silica and alumina as the main ingredients are mixed, It has the 1st process of manufacturing a processing agent of cement, and the 2nd process of scouring cement using solution which made

dissolving a processing agent manufactured by the 1st process in cement kneading water, and was obtained by this. It is the 2nd process and, specifically, mixing percentage of a processing agent is made into 5.0 to 0.05 weight % for mixing percentage of cement kneading water 95.0 to 99.95weight %. Since a processing agent is used according to this disposal method, making it dissolve in cement kneading water, effect sufficient by a processing agent of a smaller quantity can be acquired, and enforcement in a construction site is attained.

[0012]
[Effect of the Invention]According to the processing agent and disposal method of cement concerning above-mentioned this invention, ** can also suppress effectively elution of hexavalent chromium from cement **** ground improvement or a cement structure inexpensive by a simple method.
[0013]
[Mode for carrying out the invention]Hereafter, the processing agent and disposal method of cement concerning this invention are explained concretely. The processing agent of this invention mixes ferrous sulfate as the 1st raw material, and the rock powder end as the 2nd raw material, is produced, and mixes and uses this processing agent for cement or cement kneading water.
[0014]In 1st raw material this example, the ferrous sulfate used as the 1st raw material is an iron sulfide generated as by-products by the manufacturing process of titanium oxide, and is in the wet state containing moisture.This ferrous sulfate contains crystal water and is expressed with chemical symbol:FeSO4 and 7H 2O.
[0015]The following result was obtained when X-ray fluorescence was performed to the iron sulfide generated as by-products by the manufacturing process of titanium oxide.
TiO2 : 0.24 weight % Mn : 0.16 weight % Fe : In addition, SO4, H2O, etc. are contained in ignition loss in the above-mentioned analysis result 18.50weight %.

[0016]Natural seasoning (carrying out sun drying) or mechanical desiccation (drying room temperature is adjusted to 80 ** or less, warm air is sent, and it dries as much as possible for a short time) is performed to the above-mentioned ferrous sulfate, and moisture is removed. Crystal water may collapse and a presentation of ferrous sulfate may change with these drying stages to FeSO4, 7H 2O-FeSO4, and 1H 2O. Then, this ferrous sulfate is ground to 100 or less meshes, and processing of the 1st raw material is completed.
[0017]In 2nd raw material this example, rock used as the 2nd raw material is a rock which exists in a nature, it has F-potential-15mV--50mV and a metamorphic rock of a **** system which uses alumina and silica as the main ingredients is good preferably.As the example of representation, **** produced in the Kita-Shitara-gun, Aichi inner step Todaka field prefectural nature park area is mentioned. F-potential of this **** is -20mV--30mV. The following result was obtained when X-ray fluorescence was performed to above ****.
SiO2 : 80.18 weight % aluminum2O3 : 10.78 weight % Fe2O3 : 0.56 weight % Na2O : 2.53 weight % K2O : 3.93weight % in addition, H2O etc. are contained in ignition loss in the above-mentioned analysis result.
[0018]Above **** is ground to 100 or less meshes using a machine suitable for rock grinding of a ball mill, a roller mill, etc., and processing of the 2nd raw material is completed.
[0019]At last [rock powder] (F-potential-20mV--30mV) as ferrous sulfate (FeSO4, 7H2O-FeSO4, and1H2O) and the 2nd raw material as the 1st raw material which it is the manufacturing method above of a processing agent, and was produced by making is mixed by the next distribution.
Ferrous sulfate : The end of the 20 to 80 weight % rock powder : 80 to 20 weight % [0020]Exclusive mixers, such as a mortar mixer or a NAUTA mixer, are used for mixing of two raw materials, stirring more than for 1 minute is performed to it, and the processing agent with which two raw materials were fully mixed is obtained.

[0021]When mixing and using for cement the processing agent produced by performing it above when mixing and using it for directions-for-use ** cement, mixing percentage of a processing agent is made into 5.0 to 0.5 weight % for the mixing percentage of cement 95.0 to 99.5weight %.This method is effective when carrying out at a cement production factory.
** When using the processing agent produced by performing it above when using it, making it dissolve in cement kneading water, making it dissolve in cement kneading water, make mixing percentage of a processing agent into 5.0 to 0.05 weight % for the mixing percentage of cement kneading water 95.0 to 99.95weight %. This method is effective when carrying out at a construction site or a ready-mixed concrete factory.
[0022]Also in which method, if the mixing percentage of a processing agent becomes smaller than the above-mentioned lower limit, an effect will fall remarkably. Compared with the effect that making mixing percentage of a processing agent larger than the above-mentioned upper limit is acquired by it, increase of cost becomes remarkably large. Therefore, as for the mixing percentage of a processing agent, it is preferred to set it as a suitable value within the limits of the above according to the content (elution volume) of the hexavalent chromium which changes with the kind of cement, a manufacturing maker, plants, etc.
[0023]In order to prove the example of an actual proof next the processing agent of this invention, and the effect of a disposal method, the content or the elution volume of hexavalent chromium was measured about many samples.The result about the typical sample is shown in Table 1 - 5. The diphenylcarbazide method was adopted as measuring of a hexavalent chromium content in the following example 1 of an actual proof - the example 4 of an actual proof. Measuring ranges are 0.05 mg/l - 2 mg/l. JIS K-0102.65.2 was adopted as measuring of a hexavalent chromium elution volume in the following example 5 of an actual proof.

[0024](Example 1 of an actual proof) The following table 1 expresses the result of having measured the quantity of the hexavalent chromium contained in surplus water about each sample (No.1-3) to which the mixed amount of the processing agent was changed, when mixing and using a processing agent for cement.

[0025]
[Table 1]

試料 No.	セメント (g)	水 (cc)	処理剤 (g)	六価クロム含有量 (mg/l)
1	10	10	0.00	2.00
2	10	10	0.15	0.05未満
3	10	10	0.20	0.05未満

[0026]In the sample 1 which does not mix the processing agent of this invention as shown in Table 1. The sample 2 with which the hexavalent chromium content mixed the processing agent 0.15g of this invention to the cement 10g to 2 mg/l and a high value being shown, In the sample 3 which mixed the processing agent 0.20g of this invention to the cement 10g, the hexavalent chromium content of surplus water is falling remarkably with less than 0.05 mg/l.
[0027](Example 2 of an actual proof) The following table 2 expresses the result of having measured the quantity of the hexavalent chromium contained in surplus water about each sample (No.4-6) to which the mixed amount of the processing agent was changed, when mixing a processing agent with cement and using it for improvement of the foundation.
[0028]
[Table 2]

試料 No.	セメント (g)	土 (g)	水 (cc)	処理剤 (g)	六価クロム含有量 (mg/l)
4	10	100	20	0.00	0.50
5	10	100	20	0.15	0.05未満
6	10	100	20	0.20	0.05未満

[0029]In the sample 4 which does not mix the processing agent of this invention as shown in Table 2. The sample 5 with which the hexavalent chromium content mixed the processing agent 0.15g of this invention to the cement 10g and the ground 100g to 0.50 mg/l and a high value being shown, In the sample 6 which mixed the processing agent 0.20g of this invention to the cement 10g and the ground 100g, the hexavalent chromium content of surplus water is falling remarkably with less than 0.05 mg/l.

[0030]When mixing and using a processing agent for cement, judging from the result of Table 1 and 2, and the result (graphic display abbreviation) about other samples from which the mixing percentage of a processing agent differs, it can be said that it is preferred to consider it as 0.5 weight % or more as for the mixing percentage of a processing agent, and it is more preferred to consider it as 1.5 weight % or more.

[0031](Example 3 of an actual proof) The following table 3 expresses the result of having measured the quantity of the hexavalent chromium contained in surplus water about each sample (No.7-9) to which the mixed amount of the processing agent was changed, when mixing and using a processing agent for cement kneading water.

[0032]

[Table 3]

試料 No.	セメント (g)	水 (cc)	0.15% 水溶液 (cc)	0.2% 水溶液 (cc)	六価クロム含有量 (mg/l)
7	10	10	0	0	2.00
8	10	0	10	0	0.05未満
9	10	0	0	10	0.05未満

[0033]In the sample 7 which does not mix the processing agent of this invention as shown in Table 3. The sample 8 which mixed 10 cc of solution (cement kneading water + processing agent) in which the hexavalent chromium content contained this invention processing agent in the cement 10g 0.15% to 2 mg/l and a high value being shown, In the sample 9 which mixed 10 cc of solution (cement kneading water + processing agent) which contained this invention processing agent in the cement 10g 0.2%, the hexavalent chromium content of surplus water is falling remarkably with less than 0.05 mg/l.

[0034](Example 4 of an actual proof) The following table 4 expresses the result of having measured the quantity of the hexavalent chromium contained in surplus water about each sample (No.10-12) to which the mixed amount of the processing agent was changed, when mixing a processing agent in cement kneading water and using it for improvement of the foundation.

[0035]

[Table 4]

試料 No.	セメント (g)	土 (g)	水 (cc)	0.15% 水溶液 (cc)	0.2% 水溶液 (cc)	六価クロム含有量 (mg/l)
10	10	100	20	0	0	0.50
11	10	100	0	20	0	0.05未満
12	10	100	0	0	20	0.05未満

[0036]In the sample 10 which does not mix the processing agent of this invention as shown in Table 4. The sample 11 which mixed 20 cc of solution (cement kneading water + processing agent) in which the hexavalent chromium content contained this invention processing agent in the cement 10g and the ground 100g 0.15% to 0.50 mg/l and a high value being shown, In the sample 12 which mixed 20 cc of solution (cement kneading water + processing agent) which contained this invention processing agent 0.2% to the cement 10g and the ground 100g, the hexavalent chromium content of surplus water is falling remarkably with less than 0.05 mg/l.

[0037]When mixing and using a processing agent for cement kneading water, judging from the result of Table 3 and 4, and the result (graphic display abbreviation) about other samples from which the mixing percentage of a processing agent differs, the mixing percentage of a processing agent, It can be said that it is preferred to consider it as 0.05 weight % or more, and it is more preferred to consider it as 0.15 weight % or more.
[0038](Example 5 of an actual proof) The following table 5 expresses the result of having measured the quantity of the hexavalent chromium eluted from a cement solidification thing about each sample (No.13, 14) to which the mixed amount of the processing agent was changed for the solidifying material of the cement processed by the processing agent of this invention.
[0039]
[Table 5]

試料 No.	セメント (g)	水 (cc)	処理剤 (g)	0.1% 水溶液 (cc)	六価クロム溶出量 (mg／l)
13	20	20	0.3	0	0.01未満
14	20	0	0	20	0.01未満

[0040]Also in any of the sample 13 which mixed the processing agent 0.3g of this invention with the cement 20g as shown in Table 5, and the sample 14 which mixed 20 cc of solution (cement kneading water + processing agent) which contained this invention processing agent in the cement 20g 0.1%, The elution volume of hexavalent chromium has less than 0.01 mg/l and a low value.
[0041]It not only can stop the hexavalent chromium content in surplus water effectively, but according to the processing agent of this invention, it can control effectively the elution volume of hexavalent chromium from a cement solidification thing so that clearly [as a result of being Table 1 - 4 in addition] from the result of Table 5.
[0042]Although the processing agent of this invention mixes ferrous sulfate which is the 1st raw material, and the end of rock powder which is the 2nd raw material and both raw materials control elution of hexavalent chromium in synergistic effect, Since hexavalent chromium elution depressor effect is demonstrated even when the 1st raw material and the 2nd raw material are independent respectively, it is also effective to use one of raw materials for processing of cement independently by conditions, such as a process.